

CLAIMS

1. Lock cylinder consisting of a cylinder housing (10.3; 10.4) and a cylinder core (20.3; 20.4), which is supported (11) rotatably in the housing,

-- a key with a defined longitudinal profile being assigned to the core,

-- with a group of diametric shafts (23.3; 23.4) arranged in a row in the axial direction of the cylinder core (20.3; 20.4),

-- which hold plate-shaped tumblers (31.3-34.3; 31.4-33.4), the longitudinal edges (30.1; 30.2) of which are free to slide longitudinally along guide surfaces (21; 21) of the shaft (23.3), the tumblers also being spring-loaded (13.3; 13.4) in one of the two directions of their movement;

-- where each tumbler (31.3-34.3; 31.4-34.4) has a control edge (41.3-44.3; 41.4-43.4) in correspondence with the longitudinal profile of the key, each control edge being located at a defined height;

-- with a radial opening (61.3; 61.4) in the cylinder core (20.3; 20.4) and an insert (62.3; 62.4), which can be inserted into the opening;

-- the outer end (63.3; 63.4) of which insert does not project beyond the external contour of the cylinder core (20.3;

20.4) after its insertion, whereas the inner end (64.3; 64.4) engages in a cutout (36.3; 36.4) in the facing edge of the longitudinal plate edge (30.2) of the tumbler (31.3-34.3; 31.4-34.4);

-- as a result of which the spring-loaded tumblers (31.3-34.3; 31.4-34.4) are secured in the cylinder core (20.3; 20.4) before the core is installed in the housing (10.3; 10.4) and thus a loss-prevention function is provided;

characterized in that

-- the insert consists of a comb-like body (comb 62.3; 62.4) with teeth (36.3, 36.3; 36.4, 36.4'), the inner ends (64.3; 64.4) of which have a profile with at least one pair of oppositely-facing flanks (flank pair 37.3a/38.3a, 37.3i/38.3i; 37.4/38.4, 37.4'/38.4');

-- whereas the cutouts (26.3; 26.4) in the tumblers (31.3-34.3; 31.4-34.4) have at least one pair of opposing flanks (opposing flank pair 27.3a/28.3a; 27.3i/28.3i; 27.4a/28.4a; 27.4i/28.4i), which are in different positions on the tumblers (31.3-34.3; 31.4-34.4) which have their control edges (41.3-44.3; 41.4-43.4) at different heights; in that

-- the flank pairs (37.3a/38.3a, 37.3i/38.3i; 37.4/38.4, 37.4'/38.4') and the opposing flank pairs (27.3a/28.3a, 27.3i/28.3i; 27.4a/28.4a, 27.4i/28.4i) are arranged in such a

way that, after the comb (62.3; 62.4) has been inserted and the key has been withdrawn, the control edges (41.3-44.3; 41.4-43.4) of at least two tumblers (31.3-34.3; 31.4-34.4) are at the same height (50.4, 60.3, 60.4; 50.5, 60.5, 60.6), which thus conceals the actual position of the control edges (41.3-44.3; 41.4-43.4),

-- when, in the rest position of the spring-loaded (13.3; 13.4) tumblers (31.3-34.3; 31.4-34.4), one of the flanks (38.3i) rests against one of the opposing flanks (28.3i) and/or

-- when, in an actuated position, after maximum displacement (77) of the tumblers (31.3-34.3; 31.4-34.4) by a lock-picking tool, the other flank (37.3i) meets the other opposing flank (27.3i).

2. Lock cylinder according to Claim 1, characterized in that a set of different combs (62.3; 62.4) is assigned to a plurality of similar cylinder cores (20.4), the teeth (36.3, 36.3'; 36.4, 36.4') of the combs being provided with different profiles.

3. Lock cylinder according to Claim 1, characterized in that a set of different combs (62.3; 62.4) is assigned to a plurality of similar cylinder cores (20.4),

-- where the teeth (36.3, 36.3'; 36.4, 36.4') of the combs have similar profiles and are arranged in either the normal or reversed position as desired and/or in different sequences on

the comb (62.3; 62.4);

-- where, in order to increase the number of variations of the lock cylinder, one of these different combs (62.3; 62.4) is selected and inserted into one of the cylinder cores (20.3; 20.4) of uniform type.

4. Lock cylinder according to one of Claims 1-3, characterized in that the profiles of all the teeth (36.3, 36.3'; 36.4, 36.4') on the comb are of similar design.

5. Lock cylinder according to one of Claims 1-4, characterized in that the opposing flanks (27.3a/28.3a; 27.3i/28.3i; 27.4a/28.4a; 27.4i/28.4i) of the cutouts (26.3; 26.4) are offset from each other in the height direction in the case of the tumblers (31.3-34.3; 31.4-34.4) with control edges (41.3-44.3; 41.4-43.4) in different positions.

6. Lock cylinder according to one of Claims 1-5, characterized in that the inner ends (64.3; 64.4) of the teeth (36.3, 36.3'; 36.4, 36.4') of the comb are convexly profiled in the radial direction with at least two pairs of flanks (37.3a/38.3a; 37.3i/38.3i; 37.4/38.4; 37.4'/38.4'), which are arranged in sequence in the direction of longitudinal movement and are at different heights; in that

-- the cutouts (26.3; 26.4) in the tumblers (31.3-34.3; 31.4-34.4) are concavely profiled in the radial direction and

have sections which form at least two pairs of opposing flanks (27.3a/28.3a; 27.3i/28.3i; 27.4a/28.4a; 27.4i/28.4i), which are arranged in sequence in the direction of longitudinal movement and are offset from each other in the height direction

7. Lock cylinder according to one or more of Claims 1-6, characterized in that, although all of the teeth have essentially the same convex profile at their inner ends (64.3; 64.4), they are positioned in similar openings of the cylinder core (20.3; 20.4) in two different laterally reversed orientations (normal tooth 36.3; 36.4 / reversed tooth 36.3', 36.4'); and in that

-- the pairs of flanks (37.3a/38.3a, 37.3i/38.3i; 37.4/38.4, 37.4'/38.4') of the normal teeth (36.3; 36.4) are laterally reversed with respect to those of the reversed teeth (36.3'; 36.4').

8. Lock cylinder according to Claim 7, characterized in that the normal tooth (36.3; 36.4) of the inserted comb (62.3; 62.4) is laterally reversed with respect to a transverse plane, which passes diametrically through the cylinder core (20.3; 20.4) in the area of the axis and extends transversely to the spring-loading (13.3; 13.4) of the tumblers (31.3-34.3; 31.4-34.4).

9. Lock cylinder according to one of Claims 1-8,

characterized in that the maximum point of the tooth profile (36.3, 36.3') positioned in the cylinder core (20.3) lies essentially on the transverse plane (71.3) of the cylinder core (20.3).

10. Lock cylinder according to Claim 9, characterized in that a tooth (36.3; 36.3') of the comb has two pairs of flanks (37.3a/38.3a; 37.3i/38.3i), namely, an inner pair (37.3i/38.3i), which is closer to the transverse plane (71.3) of the cylinder core (20.3), and an outer pair (37.3a/38.3a), which is farther away from the transverse plane (71.3).

11. Lock cylinder according to Claim 10, characterized in that the flanks of inner flank pair (37.3i/38.3i) are symmetrical to the transverse plane (71.3) of the cylinder core (20.3),

-- whereas the flanks (37.3a, 38.3a) of the outer flank pair are asymmetric with respect to the transverse plane (71.3).

12. Lock cylinder according to one of Claims 1-11, characterized in that the flanks of the inner flank pair (37.3i/38.39) are parallel to the transverse plane (71.3),
whereas

-- the flanks of the outer flank pair (37.3a/38.3a) are positioned at an angle to the transverse plane (71.3).

13. Lock cylinder according to Claim 12, characterized in

that the two outer flanks (37.3a, 38.3a) are angled in the same way as essentially mirror images of each other.

14. Lock cylinder according to Claim 13, characterized in that the length of one of the outer flanks (37.3a) is different from that of the other outer flank (38.3a).

15. Lock cylinder according to one of Claims 1-8, characterized in that the maximum points of the teeth (36.4, 36.4') of the inserted comb (62.4) are located a certain distance away in the height direction from the transverse plane (71.4) of the cylinder core (20.4).

16. Lock cylinder according to Claim 15, characterized in that the convex profile serving to control the tumbler (31.4-34.4) is positioned at one end of the tooth (36.4, 36.4').

17. Lock cylinder according to Claim 15 or 16, characterized in that the convex profile of the normal tooth (36.4) is an exact mirror image of the profile of the reversed tooth (36.4') in the direction of the longitudinal movement of the tumblers (41.4-4.4).

18. Lock cylinder according to one or more of Claims 15-17, characterized in that, although the convex profile of the teeth (36.4, 36.4') has only one pair of flanks (37.4/38.4; 37.4'/38.4'), one of the flanks (37.4, 37.4') has a form different from that of the other flank (38.4, 38.4').

19. Lock cylinder according to Claim 18, characterized in that one of the flanks (38.4, 38.4') is essentially parallel to the transverse plane (71.4) of the cylinder core (20.4), whereas the other flank (47.4, 47.4') forms an angle with that plane.

20. Lock cylinder according to one or more of Claims 15-19, characterized in that the normal teeth (36.4) and the reversed teeth (36.4') are arranged in an alternating sequence in the successive shafts (23.4) of the cylinder core (20.4).

21. Lock cylinder according to Claim 20, characterized in that the comb (62.3, 62.4), has an even number of teeth (36.4, 36.4'); and in that

-- the comb (62.4) can be inserted into the cylinder core (20.4) with either one of two different orientations, one the reverse of the other,

-- where the comb (62.4) begins with a normal tooth (36.4) when inserted with one of the two orientations, whereas a reversed tooth (36.4') is at the front of the comb (62.4) when the comb is inserted with the other orientation.

22. Lock cylinder according to Claim 1-21, characterized in that, although the cutouts (26.3; 26.4) in the individual tumblers (31.3-34.3; 31.4-34.4) are of similar design, they have different dimensions as a function of the height position of the control edge (41.3-44.3; 41.4-44.4).

23. Lock cylinder according to Claim 23, characterized in that the cutouts (26.3) are designed with two steps and thus produce two pairs of opposing flanks (27.3a-28.3i) at different depths,

-- namely, an inner pair of opposing flanks (27.3i, 28.3i) on the lower step of the cutout (26.3) and an outer pair (27.3a, 28.3a) on the upper step.

24. Lock cylinder according to Claim 23, characterized in that the cutout (26.4) has a separating web (74.1-74.4), and in that

-- as a function of the height position of the control edge (41.4-44.4) of the associated tumbler (31.4-44.4), the lengths or positions (76.1-76.4) of the cutouts (26.4) and/or the positions of the webs (74.1-74.4) in the cutouts and/or the lengths of the webs are different.

25. Lock cylinder according to Claim 24, characterized in that the separating web (74.1-74.4) is positioned essentially at the longitudinal midpoint (75.1-75.4) of the cutout (26.4).

26. Lock cylinder according to Claim 24 or Claim 25, characterized in that the cutouts (26.4) have two pairs of opposing flanks (27.4a-28.4i),

-- where one of the pairs of opposing flanks (27.4i, 28.4i) is formed by the two terminal edges of the separating web (74.1-

74.4), which form inner opposing flanks (27.4i, 28.4i), which face away from each other;

-- whereas the other pair of opposing flanks (27.4a, 28.4a) is formed by the two inner edges at the outer end of the cutout (26.4), which form outer opposing flanks (27.4a, 28.4a), which face each other.

27. Lock cylinder according to Claim 23 or Claim 26, characterized in that the inner opposing flanks (27.4i, 28.4i) have a design different from that of the outer opposing flanks (27.4a, 28.4a).

28. Lock cylinder according to Claim 27, characterized in that the inner opposing flanks (27.4i, 28.4i) are essentially parallel to the transverse plane (71.4) of the cylinder core (20.4), whereas the outer opposing flanks (27.4a, 28.4a) are at a certain angle to the transverse plane (71.4).

29. Lock cylinder according to Claim 28, characterized in that the angles of the two outer opposing flanks (27.4a, 28.4a) are essentially exact mirror images of each other.